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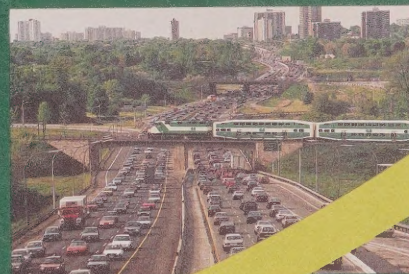


A STRATEGY FOR SUSTAINABLE TRANSPORTATION IN ONTARIO

Report of the
Transportation and
Climate Change
Collaborative



National Round Table on the
Environment and the Economy



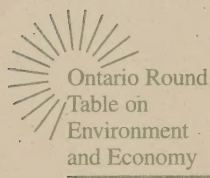
Contents

<i>Collaborative participants</i>	<i>2</i>
<i>Message to the Premier</i>	<i>3</i>
✓ <i>Foreword</i>	<i>4</i>
<i>A recommended strategy for sustainable transportation</i>	<i>6</i>
✓ <i>Greenhouse gas facts and figures</i>	<i>9</i>
<i>Transportation sector facts and figures</i>	<i>10</i>
✓ <i>Why take action on climate change?</i>	<i>11</i>
✓ <i>Education and awareness – fundamental to progress</i>	<i>15</i>
<i>Towards more compact, mixed-use communities</i>	<i>17</i>
<i>Effecting a shift from automobiles to transit</i>	<i>19</i>
<i>Cleaner, more fuel-efficient automobiles</i>	<i>21</i>
<i>Reducing emissions from freight transport</i>	<i>26</i>
✓ <i>Conclusions and future directions</i>	<i>29</i>
<i>Collaborative members signatures</i>	<i>30</i>
<i>Acknowledgements and Collaborative research reports</i>	<i>32</i>

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Report of the
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Collaborative

Co-sponsors

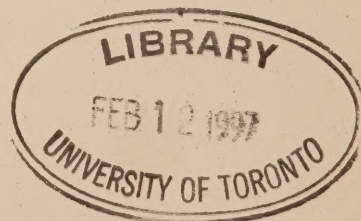


National Round Table on the
Environment and the Economy

Collaborative participants

Representatives from the following organisations participated in the Collaborative

Agincourt Infiniti Nissan
Canada Transport International Ltd.
Canadian Auto Workers
Canadian Climate Program
Canadian Urban Transit Association
City of London
Canadian National
Consumers Gas
Cooper Automotive
Contemporary Information Analysis
General Motors of Canada
GO Transit
Hough Stansbury Woodland Naylor Dance
Iain Angus and Associates
IBI Group
International Development Research Centre
Municipality of Metropolitan Toronto
National Round Table on the Environment and the Economy
Navistar International
Ontario Corn Producers' Association
Ontario Hydro
Ontario Northland Transportation Commission
Ontario Round Table on Environment and Economy
Pollution Probe
Region of York
Runnalls Research Associates Inc.
Sierra Club of Canada
Sunoco Inc.
Union Gas
University of Toronto
Waterfront Regeneration Trust



Message to the Premier

Honourable Michael Harris
Premier of Ontario

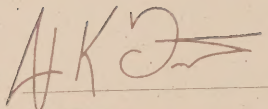
Dear Premier Harris:

It is our pleasure to present the report of the Transportation and Climate Change Collaborative. The report contains a transportation strategy and actions that we believe will move Ontario towards a more environmentally, socially and economically sustainable future.

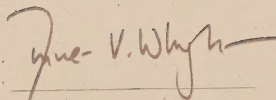
The members of the Collaborative and the transportation sector stakeholders and individuals who contributed to this report believe climate change is a serious problem and want to see progress made on reducing carbon dioxide emissions and the related risks of climate change. We believe this can and must be done while maintaining Ontario's economic competitiveness and providing the public with access to essential and affordable transportation services.

Current transportation trends are not sustainable. Canada will not meet its national objective of stabilizing greenhouse gas emissions at 1990 levels by the year 2000 without a substantial contribution by Ontario. As a national and international leader on transportation policy, Ontario should continue to lead in the broader context of sustainable transportation. Other regions and countries are beginning to take action on climate change. Canada cannot afford to fall behind.

To meet the global challenge posed by climate change, all nations will have to alter some of their transportation policies, technologies and practices. Ontario can benefit greatly by accepting the challenge now and securing a leading position in developing the technologies and services that will be needed in the next century. We encourage a full range of actions by governments, industries and individuals to meet the transportation needs of the future in a sustainable way.




Jon Grant
Chair



Anne Whyte
Vice-Chair

November 1995

Foreword



Ontario has dealt effectively with a number of environmental challenges over the past three decades, often providing national and international leadership. Sewage treatment plants were built and upgraded, and the Great Lakes show signs of improvement. Added controls have been put on toxic chemicals, such as mercury, PCBs and pesticides, and fish are safer to eat. Acid rain is being reduced and smaller lakes are starting to recover. Wastes are being recycled by citizens and industries, and turned into useful products. One of the greatest economic and environmental challenges now facing Ontario and the world is the control of carbon dioxide and other greenhouse gases that threaten to destabilize the climate and lead to global warming.

The members of the Transportation and Climate Change Collaborative agree that climate change is a serious problem. Discharges of greenhouse gases have been growing steadily and scientists warn that the behavior of the climate system will change as the atmospheric concentrations of these gases increase. The potential risk to ecosystems and human economic and social well-being justifies taking reasonable and prudent actions now.

The Collaborative was formed at a critical point in Canada's effort to develop a National Action Program on Climate Change. Canada was one of the first countries to ratify the international Framework Convention on Climate Change, which entered into force on March 21, 1994. The objective of the convention is "to stabilize atmospheric concentrations of greenhouse gases at levels which do not cause dangerous anthropogenic interference in the Earth's climate." As an initial step, developed countries have agreed to adopt national policies and measures with the aim of returning their greenhouse gas emissions to 1990 levels by the year 2000.

Reducing emissions to the levels scientists believe may be needed to prevent dangerous interference with the global climate system will be an enormous challenge for Canada and all nations. The recommendations in this report represent an important step towards meeting that challenge.

The Collaborative was established as a partnership between the Ontario and National round tables on environment and economy. Collaborative members include automobile and truck manufacturers, assemblers, parts suppliers and dealers; transit and railway operators; labor groups; municipalities and regional governments; alternative fuel producers; environmental groups; petroleum refiners; electric and natural gas utilities; and a range of transportation, planning and economics experts.



From January to September 1995, the Collaborative commissioned research and held multi-stakeholder discussions on Ontario's transportation options and choices. The basis for the Collaborative's work was "sustainable transportation", in which social, economic and environmental factors were considered in the development of options and the recommendation of future directions. There was a special focus on carbon dioxide emissions, since the transportation sector is the single largest source of Canada's emissions of this greenhouse gas. The transportation sector includes automobiles, trucks and buses, as well as air, rail and marine transport. Air and marine transport are relatively minor sources of greenhouse gases and were not studied by the Collaborative. Rail transport was studied, even though it is a relatively minor source of greenhouse gases, since it is frequently promoted as an alternative to truck transport.

This report shows that senior decision-makers from a broad set of interests can develop a strategy to reduce carbon dioxide emissions from Ontario's transportation sector. The strategy proposed in this report will contribute to the national stabilization objective by reducing transportation energy demand and related carbon dioxide emissions in Ontario, while providing essential services and maintaining the economic competitiveness of the transportation sector. Controlling Ontario's greenhouse gas emissions will not only deal with a serious environmental problem, but also can create economic opportunities. The costs of inaction on this issue could be significant, including future job losses to competitors from other countries, who are already developing and promoting technologies that reduce greenhouse gas emissions.

We believe our society can make progress towards meeting the climate change challenge and we invite governments, industry and the people of Ontario to deal with the greenhouse gas implications of their transportation decisions. Collaborative members believe that leadership on climate change in Ontario will build confidence in Canada and other nations that progress can be made to resolve one of the greatest environmental challenges facing the world in the 21st century.



A recommended strategy for sustainable transportation

Ten research studies were commissioned to advise the Collaborative on how to deal with carbon dioxide emissions from transportation (see last page of this report). The research reports and the views of the transportation sector stakeholders who reviewed and commented on the reports form the base upon which Collaborative members recommend the following sustainable transportation strategy, for which many of the recommendations require provincial leadership.

The main components of the strategy, not listed in order of priority, are summarised below. The strategy components are explained in greater detail in later sections of the report.

Education and awareness — fundamental to progress (p. 15-16)

- Design and implement a broad range of programs to ensure that the public understands the risks of climate change and the need to economize on the use of fossil fuels.

- Implement policies that will bring about more compact, mixed-use development in urban areas to shorten travel distances and reduce vehicular travel demand.

Effecting a shift from automobiles to transit (p. 19-20)
Existing funds for public transit must be maintained and used more wisely, and new investments must be made to ensure that public transportation choices and alternatives are effective.

- Establish decision-making bodies in large urban areas to evaluate, plan and deliver integrated transportation and urban development, as well as integration of transit systems and services.
- Implement transit priority measures to make transit time-competitive with automobile travel.
- Maintain sufficient funding to ensure adequate transit capacity; increase the acceptability of using funds from user pay sources to improve public transit and enhance transit service in areas with sufficient population densities.
- Implement pricing and supply policies to control parking and encourage transfer to transit.

- Implement fuller cost pricing for transportation modes to discourage the overuse of single occupant vehicles and encourage the use of more fuel-efficient technologies and transportation modes.

- Develop a Memorandum of Understanding with automotive manufacturers to increase the availability of fuel-efficient models, recognizing the linkage between gasoline prices and consumer demand for more fuel-efficient vehicles.

- Implement mandatory vehicle inspection and maintenance programs in large urban areas to ensure the proper operation of emission control equipment.

Towards more compact, mixed-use communities (p. 17-18)

Canadian cities use four to five times more energy for transportation than comparable European cities.

Cleaner, more fuel-efficient automobiles (p. 21-25)

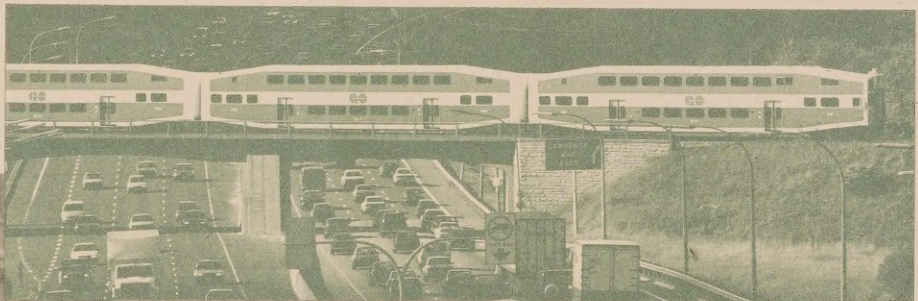
Hidden costs should be reflected in transportation decisions. The costs of pollution, accidents, health and policing are paid for by society, but their connection to transportation is poorly understood by most people.

- Maintain incentives for the use of cleaner alternative fuels and explore ways to promote further the development and use of alternative fuelled vehicles.
- Develop an Ontario capability to participate in the U.S. government's and the Big Three auto manufacturers' Partnership for a New Generation of Vehicles (PNGV). The PNGV is working to develop vehicles that will achieve a threefold increase in fuel efficiency over today's vehicles, while maintaining size, performance, utility and safety.
- Enhance intermodal freight transfer facilities and services and encourage the development of new intermodal technologies and service levels.

Any move to significantly increase taxes or user charges should be considered in the broader context of overall reform of the tax system, including the issue of fair and equitable taxation, and should recognize the need for a comprehensive plan to sustain the health of the environment and the economy.

Reducing emissions from freight transport (p. 26-28)

Properly applied, user fees and fuller cost pricing will lead to more cost-effective and less polluting transportation systems for both people and freight.



A recommended strategy for sustainable transportation

If fully implemented, the recommended strategy will yield significant benefits in terms of improved public health, due to lower smog levels and lower levels of toxic chemicals (such as benzene) in the air, economic savings from timely maintenance, rehabilitation and improvements to existing transportation infrastructure, and lower carbon dioxide emissions than projected as a result of current transportation trends. It will also help restore Ontario's economic competitiveness, which is threatened by traffic congestion in major cities, particularly the Greater Toronto Area.

The strategy is proposed as a comprehensive and integrated package of initiatives. Education and awareness-raising initiatives explain to people the economic, social and environmental benefits of more sustainable transportation, including the need to conserve fossil fuels. Compact, mixed-use communities support cost-effective public transit and reduced automobile dependency. Increased gasoline prices reduce single occupant vehicle travel and promote the use of cleaner fuels and efficient vehicles. More fuel-efficient vehicles decrease carbon dioxide emissions and reduce transportation costs.

Freight movement poses a special challenge. Carbon dioxide emissions are expected to increase as Ontario's population grows, commercial freight volumes increase and industrial activity becomes integrated into a North American freight logistics system dependent on timely, efficient transportation. Improvements in vehicle technologies and operating performance will continue to be made, but a major modal shift from truck to rail does not appear likely in the absence of policy measures that were beyond the scope of the Collaborative to address.

The railways are, however, making significant improvements in their intermodal operations and services and it is here that some of the best prospects for future fuel efficiency gains can be found.

If implemented as a comprehensive package, the sustainable transportation strategy should set in motion an upward trend of increasing urban population density, land use diversity and public transit use, in concert with decreasing single occupant vehicle use, increasing automobile fuel efficiency and a more energy-efficient freight transportation system. Economic benefits to the province should result from lower energy costs and the stimulus provided by increased investment in transit systems. New and improved transportation technologies should be developed and commercialized, resulting in additional economic benefits. Finally, the strategy should result in lower pollution levels, improved public health and safer, more vibrant city streets.

The Collaborative believes the more broadly the strategy is shared across Canada, the greater the effect it will have. The strategy should be widely disseminated to the people of Ontario and shared with other governments in Canada. Many of the components of the strategy work best when implemented on a Canadian or a North American basis.

Current urban transportation trends are not sustainable. In the Greater Toronto Area, the amount of energy consumed by transportation could almost double by the year 2021, due to the expanding population, increasing levels of car ownership and increases in the distance travelled per person.

Benefits of the recommended strategy:

- lower greenhouse gas emissions
- lower smog levels
- less traffic congestion
- shorter travel times
- more cost-effective transportation systems
- lower net energy costs
- investment and employment related to new technologies and services
- more vibrant city streets
- more transportation choices and better access for people

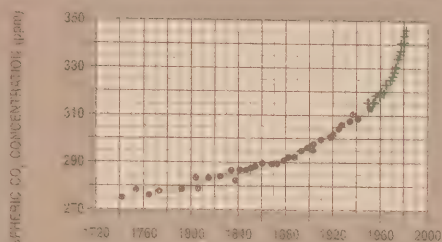
Economic impacts of the recommended strategy:

- higher transportation user fees for some modes
- research and development costs for new technologies
- effect on gasoline producers

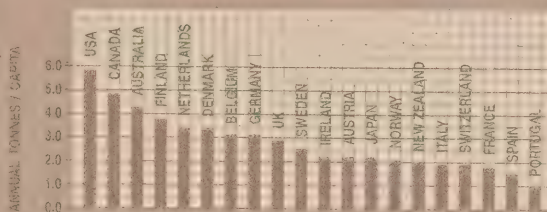


Greenhouse gas facts and figures

Record of the atmospheric concentration of carbon dioxide

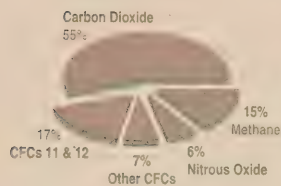


Carbon dioxide production based on population

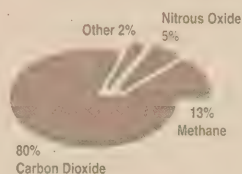


Relative contributions to the greenhouse effect of greenhouse gas emissions from human activities

Global 1980



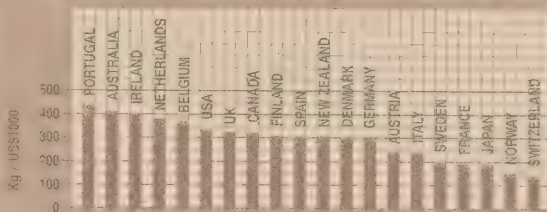
Canada 1990



Source: J. T. Houghton, et al., Climate Change: The IPCC Scientific Assessment, 1990.

Source: Canada's National Report on Climate Change, 1994.

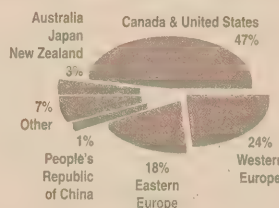
Carbon dioxide production per unit of gross domestic product



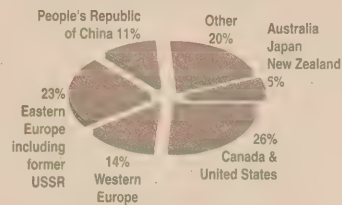
Carbon dioxide emissions by region

Source: Carbon Dioxide Information Analysis Center

1950



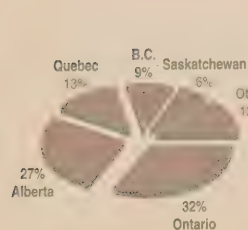
1990



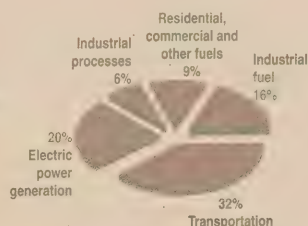
Canadian CO₂ emissions, 1990

by province

by sector



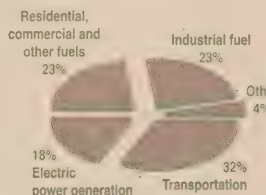
Source: Canada's National Report on Climate Change, 1994.



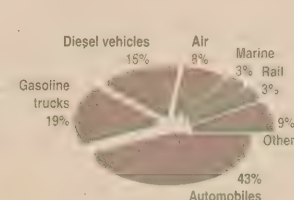
Ontario CO₂ emissions, 1990

by sector

by transportation mode



Source: Canada's National Report on Climate Change, 1994.

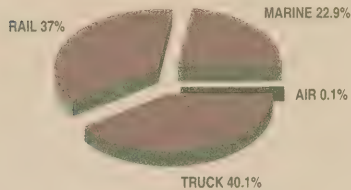


Source: Energy Outlook; Natural Resources Canada, October 1994

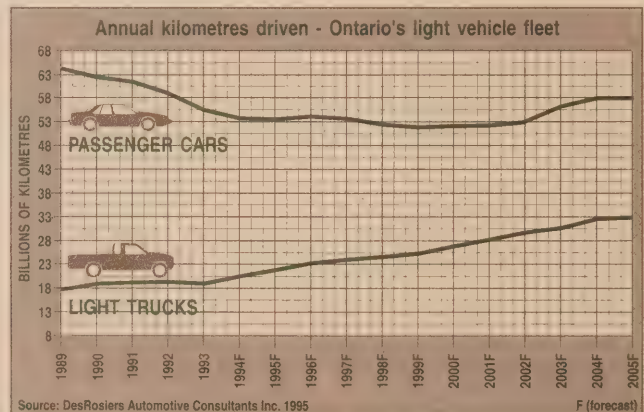
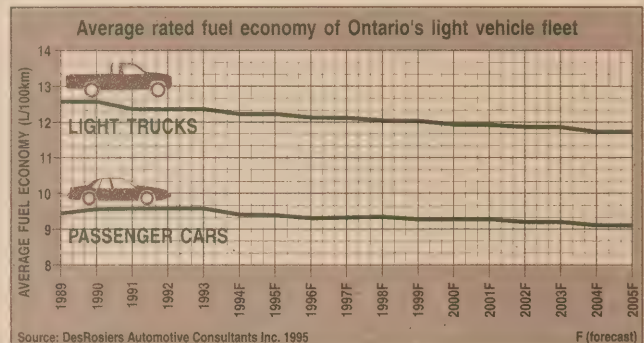
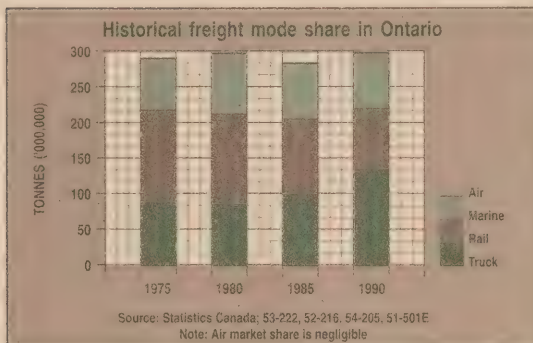
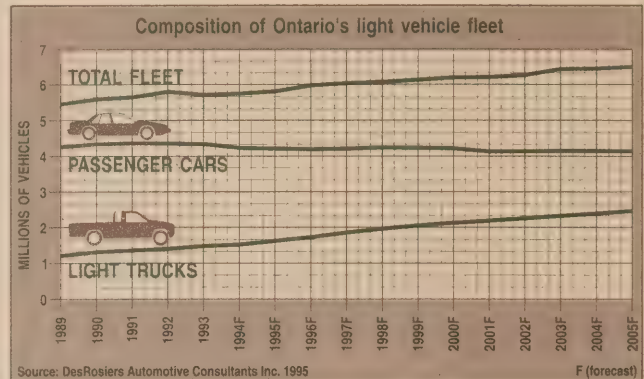


Transportation sector facts and figures

Modal distribution of freight traffic in Ontario, 1992



Source: Statistics Canada; 53-222, 5552-216, 54-205, 51-501E
(percentages based on relative total tonnages transported)



How people travel in Ontario

Mode	Millions of vehicle-km (1990)
Walking, cycling	200
Cars and light trucks	75,000
Public transit	
– Intercity bus	152
– Urban and GO Transit	457
Rail (VIA and ONTC)	12
Air	298
Total	76,709

SOURCE:

Ontario Round Table on Environment and Economy,
Transportation Sector Task Force Report, 1992

Why take action on climate change?

The effects identified in the Climate Change Impacts Study done for the Collaborative indicate that climate change might have beneficial effects, such as improved growth potential for vegetation in some areas of the province, but would also have negative effects. The greatest risks of related damage may well come from the local and regional effects of altered frequency, severity and duration of extreme events, including thunderstorms, hail, tornados, droughts and floods, as well as the increased variability of water supplies.

International and national climate change commitments

Canada tabled its National Action Program on Climate Change at the first Conference of the Parties to the Framework Convention held in Berlin in April 1995. The National Action Program noted that current forecasts predict Canada's greenhouse gas emissions could be 13 per cent higher than 1990 levels by the year 2000, if no further measures are undertaken. All jurisdictions in Canada are actively studying additional measures that can be taken to meet the national objective. These measures will be discussed at a joint meeting of the Canadian Council of Ministers of the Environment and the Council of Energy Ministers in November 1995.

Progress on reducing greenhouse gas emissions from the transportation sector will be essential to meeting Canada's international commitments. Carbon dioxide is the principal greenhouse gas emitted by Canada, accounting for more than 80 per cent of the total effect of all Canadian greenhouse gas emissions. In 1990, the transportation sector was responsible for more than 30 per cent of the carbon dioxide emissions in Canada. In turn, the Ontario transportation sector accounted for more than 30 per cent of

national transportation sector emissions. Thus, the Ontario transportation sector accounted for approximately 10 per cent of Canada's total carbon dioxide emissions in 1990.

During the past 200 years, carbon dioxide concentrations in the atmosphere have increased by more than 25 per cent relative to the average levels analyzed for at least the past 1,000 years. If the concentration of carbon dioxide doubles, as appears almost certain within the next century, global temperatures will warm, likely by 1.0 – 3.5 degrees Celsius according to the best scientific estimates. A warming of this magnitude and in so short a time is unprecedented in human history.

There is an emerging international scientific consensus, recently expressed by the Intergovernmental Panel on Climate Change in its draft Second Assessment Report (1995), "that global mean temperature changes over the last century are unlikely to be entirely due to natural causes, and that a pattern of climate response to human activities is identifiable in observed climate records." For example, the 12 warmest years during the past century have all occurred in the last 15 years. Seven of the worst forest-fire years in recorded Canadian history have

Confident projections of regional characteristics of climate change and variability, and the related frequency and severity of extreme weather events, are still beyond the capabilities of science. Such uncertainties do not reduce the risk of danger, but do increase the need for flexibility in response measures.

Major windstorm disasters (1960-1989 global estimates)

	1960-69	1970-79	1980-89
Windstorm disasters	8	13	29
Loss to the economy	20.5 billion	28.5 billion	34.3 billion
Insured loss	4.6 billion	7.5 billion	16.6 billion

SOURCE:

(1990 - \$ U.S.)

Munich Reinsurance Company (1991).
Windstorm - New Loss Dimensions of a
Natural Hazard, p. 7.



Why take action on climate change?

"...the insurance industry is first in line to be affected by climate change. It is clear that global warming could bankrupt the industry."

**Frank Nutter,
President of the
Reinsurance Association
of America**

Lake level drop during 1960's drought, illustrates one of the potential effects of climate change under a CO₂ doubling scenario.

occurred in the last 15 years. While there are uncertainties associated with the prediction of rates and regional distributions of climate change and the associated risks, the phenomenon of greenhouse gas induced climate change itself is well established.

Global effects of climate change

Climate change poses many threats to the world economy and international security. Sea level rise due to the thermal expansion of water and the melting of glaciers may displace millions of people in low-lying deltas. Increased risk of regional aridity and drought may create severe local food shortages. An increase in extreme weather events, such as floods, droughts and cyclones, may cause losses that exceed the financing capacity of the insurance and reinsurance industries. Ontario and Canada have an interest in helping to prevent these large-scale changes because we will not be able to ignore their consequences. Moreover, developing countries will look towards Canada and other industrialized countries for the transfer of energy-efficient technologies to reduce greenhouse gas emissions, and for help to cope with the effects of climate change.

Effects of climate change on Ontario

A study done for the Collaborative titled *Climate Change Impacts: An Ontario Perspective* indicates many potentially serious effects if the concentration of carbon dioxide in the atmosphere doubles. Several of these potential results are noted below:

- Average warming across the province of 3 to 8 degrees Celsius is likely to occur (i.e. greater than the global average warming of 1.0 to 3.5 degrees Celsius).
- The *net supply* of surface water to the Great Lakes basin is expected to decrease by as much as 50 per cent.
- Mean lake levels appear likely to fall from 0.5 to 2.5 metres in the Great Lakes.
- Parts of Ontario would be invaded by species of insects and wildlife not normally seen in this province.
- New diseases would move into Ontario and those already present may increase in severity and distribution. A higher mortality due to heat stress would also be expected.
- An estimated 30 new warm water fish species may invade the Great Lakes, while some existing species may disappear.
- Conditions suitable for the boreal forest are likely to disappear in much of the Great Lakes basin, to be replaced by temperate forest.
- Some outdoor winter recreation activities and related industries could be eliminated, including the southern Ontario ski industry.

The negative economic and social effects of climate change would likely include: loss of shoreline amenities and recreational opportunities; less hydroelectricity production in the Great Lakes region,



James Lloyd Environment Canada

conflicts and trade-offs among water users, including demands for the diversion of Great Lakes water to the United States and within Ontario; more frequent dredging of shipping channels and harbors; a higher rate of mortality due to heat stress; more frequent air quality incidents, with related fatalities and respiratory and cardiovascular illnesses; and increased forest losses from fires, insects and diseases.

Current emission trends, if not checked, suggest that a tripling of the carbon dioxide concentration in the atmosphere could occur in the next century. The speed of warming and the frequency and severity of climatic events accelerate under scenarios that go beyond a doubling of the carbon dioxide level in the atmosphere.

There are environmental concerns other than climate change to which the transportation sector is a major contributor. For example, transportation accounts for about one-third of the province's emissions of nitrogen oxides and volatile organic compounds, both of which are major contributors to the formation of ground-level ozone (a major component of smog). The transportation sector also accounts for two-thirds of provincial carbon monoxide emissions and releases chlorofluorocarbons (CFCs) to the atmosphere through leakage from vehicle air conditioning units in 1994 and older model vehicles. CFCs damage the ozone layer that protects us from ultraviolet radiation.

During the past decade, progress has been made in improving the energy efficiency of automobiles and in reducing regulated air pollutants. On a per kilometre basis, smog-causing emissions have been reduced by more than 90 per cent since the 1970s, and corresponding improvements have been made in new car fuel consumption. Although new cars are more effi-

cient than older cars that are being retired, efficiency improvements have begun to level off in recent years. The gains made during the past two decades in reducing emissions of regulated air pollutants and improving fuel efficiency will soon be overcome by increasing per capita rates of car ownership and use, and by the projected increase in Ontario's population.

Economic importance of Ontario's automotive sector

Concerns about climate change and other environmental impacts of transportation provide an impetus for action, but proposed measures to deal with these issues must be weighed against the costs of the measures and the benefits the people of Ontario derive from transportation systems and employment in this sector. The following statistics show the economic importance of the automotive sector to Ontario. The automotive sector is profiled since many of the Collaborative's recommendations relate to this sector:

- The automotive sector accounts directly for approximately five per cent of Ontario's Gross Provincial Product.
- This sector directly employs more than three per cent of Ontario's workforce (six per cent including retail and services).
- More than 90 per cent of Canada's vehicle manufacturing industry is located in Ontario.
- Ninety per cent of vehicles manufactured in Ontario are exported to the United States.

The automotive industry has a major spin-off effect on other industrial sectors. It is a large customer of companies providing steel, iron, copper, aluminum, plastics, tires, glass, chemicals, machinery, and construction and other services.

Smog alert

The projected decline of vehicle-related emissions of nitrogen oxides and volatile organic compounds is likely to be offset by increases in vehicle-kilometres travelled and emissions from other industrial sources, including transboundary sources in the U.S. Higher summer temperatures and any potential increase in vehicle emissions would likely result in worsening ground-level ozone conditions in Southern Ontario in future years. Ground-level ozone is also becoming an increasingly significant greenhouse gas.

Ministry of Environment and Energy

Why take action on climate change?

The Ontario industry is focused on motor vehicle assembly and on the supply of automotive parts. The assembly industry is 100 per cent foreign-owned and foreign head offices make many major investment, production and purchasing decisions for Ontario plants. Almost all product design and development takes place outside Canada. The automotive parts industry is diverse, with Canadian ownership concentrated in smaller companies in the industry, although there are a few large Canadian multi-plant firms. Continued reinvestment in the automotive industry will depend upon maintaining a competitive investment climate.

Equity and fairness

Transportation cannot be viewed solely in a province-wide context. Although 90 per cent of the traffic in Ontario moves along a narrow transportation corridor between

Windsor and Cornwall, links between northern and southern Ontario are important for the exchange of raw materials and manufactured goods, as well as people movements. While transportation in southern Ontario can take advantage of economies of scale, especially in densely populated and highly industrialized areas, northern Ontario must cope with a low population density, community isolation and much greater distances for the movement of goods and people. Both northern residents and people in rural areas across Ontario rely on the road system for access to goods, jobs, economic opportunities, and social and cultural services, including health care.

Fairness and equity are key guiding principles in the provision of transportation systems and services, both in a regional context and in terms of access to affordable transportation by children, the elderly and the disabled, and by people with lower incomes. The Collaborative's recommendations take fairness and equity principles into account by encouraging greater choice and availability of travel modes. Where user pay initiatives are proposed, measures should be tailored to minimize or offset the impacts on transportation costs in rural and remote areas, and on economically disadvantaged travellers.



The automotive sector is a significant source of employment in Ontario.

General Motors



Modern technologies and industrial practices have created a competitive automotive sector in Ontario.

In 1994, the automotive industry in Ontario accounted for:

- ▼ **16 per cent of manufacturing employment (130,000 jobs)**
- ▼ **40 per cent of exports of goods (\$46 billion)**
- ▼ **30 per cent of imports of goods (\$39 billion)**

Education and awareness – fundamental to progress

The Collaborative concludes that citizens need to understand they can make a major contribution to reducing carbon dioxide emissions by changing their travel behavior and their purchasing decisions.

The benefits of more sustainable transportation systems and travel choices are substantial. This report recommends a strategy that includes a package of linked actions which can lead to significant reductions in carbon dioxide emissions from the Ontario transportation sector. These initiatives and the benefits they convey need to be understood by the public, and by governments and other decision-makers, as preferable to the increasing costs of current trends. Since widespread understanding of climate change does not exist, and since such understanding is central to progress on this issue, the Collaborative recommends that measures be taken to increase education and awareness of climate change and the implications for Ontario.

A range of education and awareness-raising measures can be taken

Throughout the Collaborative process, a variety of education and awareness-raising measures were identified, including:

Building awareness

- Fuel efficiency labelling for new vehicles.
- Incorporating sustainable transportation materials in school curriculums.
- Guidelines promoting energy efficiency advertising by the auto industry.
- Promoting Environmental Codes of Practice, such as the one developed by the Canadian Trucking Research Institute for the trucking industry.

Taking action

- Educational initiatives targeted at drivers during vehicle inspections at inspection and maintenance stations (I&M).
- Driver training initiatives aimed at developing driving habits that conserve fuel.
- Media campaigns on the causes of global warming and potential solutions.
- Campaigns promoting alternatives to the private automobile, such as walking, bicycling, car/van pooling and public transit.

Community participation in transportation planning

Collaborative members believe that people should have the opportunity for meaningful and effective participation in transportation planning decisions in their communities, whether through municipal and regional planning initiatives or by expressing their views in environmental assessment hearings and related processes.

What people need to know to reduce greenhouse gas emissions

(Adapted from Environment Canada's *Greenhouse Gas Miser Handbook*, January 1993)

Awareness of the effect that personal transportation decisions have on the environment is essential to achieving carbon dioxide emission reductions. For example, almost 2.5 kilograms of carbon dioxide are released for every litre of gasoline burned in the average vehicle.

The City of Ottawa recently developed a Comprehensive Cycling Plan that encourages and supports the bicycle as a means of transportation. A high degree of community involvement occurred in the consultation process leading to the plan. Transportation planning in Ottawa must now include the bicycle as part of the overall transportation system, and bicycles are encouraged as an alternative to the automobile.

Education and awareness — fundamental to progress

There are currently 6.1 million vehicles (i.e. cars and light-duty trucks) in Ontario and a typical vehicle is driven 20,000 kilometres each year. Assuming an average fleet fuel economy of 12 litres per 100 kilometres, this amounts to nearly 35 million tonnes of carbon dioxide emissions annually.

There are many things each of us can do to reduce carbon dioxide emissions:

Walk or ride a bicycle

Driving a short distance to and from a store one kilometre away consumes as much as 1/4 litre of gasoline. Taking a 20- minute walk instead is good exercise and could save more than half a kilogram of carbon dioxide. Eliminating four short car trips every week could save up to 100 kg of carbon dioxide each year.



The bicycle is increasingly viewed as an alternative to automobile travel.

Take public transit

One passenger on public transit produces approximately eight times less carbon dioxide than a single driver in a car over the same distance.

Car pool

Save wear and tear on your vehicle and reduce fuel and parking costs. Each car pool can save an average of 2,000 litres of gasoline a year - almost five tonnes of carbon dioxide.

Buy a fuel-efficient vehicle

Consider fuel efficiency when buying your next vehicle. The average fuel efficiency of vehicles in Canada is about 12 litres/100 km. New cars get eight litres/100 km on average.

If you buy a car that uses six litres/100 km, you could reduce your carbon dioxide emissions by half compared to the current average vehicle fuel efficiency.

Maintain your vehicle

A poorly tuned vehicle consumes up to 10 per cent more fuel. Take your vehicle to an inspection and maintenance facility and get a regular tune-up.

Develop good driving habits

Speeding costs you money. More fuel is consumed per kilometre at higher speeds. Most vehicles consume about 10 per cent more gasoline when driven at 100 km/hr compared to 90 km/hr. At speeds above the legal limit of 100 km/hr, fuel efficiency decreases by approximately one per cent for every 1 km/hr increase in speed.

The average vehicle in Canada releases more than 5,000 kilograms of carbon dioxide each year - equal to the weight of three-and-a-half cars.

In 1990, the City of Edmonton introduced an education and training program to encourage drivers to reduce fuel consumption by changing their driving habits. A five per cent fuel consumption improvement has been achieved based on the entire city fleet. A potential fuel consumption improvement of 20 per cent is considered achievable if a high awareness level can be maintained.

RECOMMENDATIONS

▼ **The Collaborative recommends that all transportation sector stakeholders increase their efforts to build public understanding of the risks of climate change and the need to economize on the use of fossil fuels.**

Fuel consumption rating	Average distance travelled	CO ₂ emission factor for gasoline	Annual CO ₂ emissions
6.0 litres/100 km	x 20,000 km	x 2.4 kg of CO ₂ /litre	= 2.8 tonnes of CO ₂
12.0 litres/100 km (approximate average of Canadian vehicles)	x 20,000 km	x 2.4 kg of CO ₂ /litre	= 5.6 tonnes of CO ₂

Annual CO₂ savings = 2.8 tonnes of CO₂ — Annual fuel savings(@ 55¢/L) = \$660.00

Towards more compact, mixed-use communities

Improved urban planning is a long-term foundation upon which other components of the Collaborative's sustainable transportation strategy must be built. More compact, mixed-use communities would result in reduced vehicular travel demand, increased use of public transit, increased safety of pedestrians and cyclists, and less pollution.

The Collaborative concludes that current urban transportation trends are not sustainable and will result in increased traffic congestion and pollution, including increased emissions of carbon dioxide.

Village Homes, an innovative 242 home subdivision in the City of Davis, California, adopted a design based on alternative modes of transportation, energy efficiency and community interaction. An evaluation done in August 1990 found home energy use and energy consumption for transportation to be approximately one-third less than in conventional subdivisions.

Source: *Cities and Natural Process*, Michael Hough, 1995

Fundamental changes are required in the way our urban areas and infrastructure are designed and built. The trend in new residential developments towards low density, detached housing on large, single-use tracts of land is leading to further automobile dependency and making public transit inefficient and ineffective. The greatest amount of travel and the highest effects due to vehicle emissions occur in urban areas. These areas are where the best opportunities exist to implement sustainable transportation initiatives.

Current urban transportation trends are not sustainable

The Greater Toronto Area has more than three times as many "lane-kilometres" of roads per capita in recently created suburbs than in more mature built-up areas. Automobile ownership is almost twice as high in these suburbs, and people take fewer than half as many annual transit rides per person. The population in the Greater Toronto Area is projected to increase from 4.1 million in 1990 to 6.0 million by the year 2021. In the absence of new policies, current trends indicate that transportation energy consumed in this area could almost double by the year 2021, due to the expanding population, increasing levels of car ownership and increasing distance travelled per person.

Transportation energy use in major Canadian cities is four to five times larger than in comparable European cities. Reducing automobile travel demand by retrofitting and infilling existing developed areas to increase urban density, and by progressive urban planning in new development areas, would bring Ontario's transportation energy efficiency closer to that of European cities and slow the

increase in carbon dioxide emissions. Planning measures, by themselves, will not achieve stabilization of transportation sector carbon dioxide emissions in Ontario, but these measures are a long-term foundation upon which other components of the Collaborative's sustainable transportation strategy must be built.

A policy framework and vision for sustainable transportation exist

Ontario has a policy framework under the *Planning Act of Ontario* that provides useful direction and guidance, such as:

- Promotion of more efficient use of existing land and infrastructure.
- Use of public transit where transit systems exist or may be introduced in the future.
- Direction of new growth to vacant or underutilized urban land before allowing greenfield developments.
- Support for renovation, infilling and redevelopment through proper zoning restrictions.
- Encouraging new developments to have a compact form, mix of uses and densities that efficiently use land, infrastructure and public service facilities.
- Integration of transportation modes and support for the best use of existing and new transportation systems.
- Planning of public streets to meet the needs of pedestrians and to be safe, lively and accessible to everyone, including the disabled.

Towards more compact, mixed-use communities

The policy framework encourages municipal planners to promote the most efficient modes of transportation and reduce the need for the private automobile by giving priority to energy-efficient, low-polluting travel, such as walking, bicycling and public transit. The policy framework incorporates many of the directions outlined in the Transit-Supportive Land Use Planning Guidelines of the Ministry of Municipal Affairs and the Ministry of Transportation (1992). These guidelines offer a wealth of additional information on how integrated planning, design and delivery of urban development and transportation can reduce vehicular travel

demand, encourage more use of transit, walking and cycling and greatly improve the livability of Ontario's urban areas.

The Collaborative also supports the New Vision for Urban Transportation produced by the Transportation Association of Canada (TAC) in March 1993. The TAC vision complements the provincial policy framework and can help lead Ontario towards reduced vehicle use, greater transit use and lower carbon dioxide emissions, among other benefits. The vision is widely supported among professional planners and leading municipalities.

Vegetation has a major impact on climate and air quality in cities because it absorbs solar energy and removes pollutants. This aspect, and the promotion of less energy-intensive transportation modes, should be part of an integrated approach to urban planning and development.

Single-use developments.



Illustration of compact, mixed-use development.



RECOMMENDATIONS

▼ The Collaborative recommends that all levels of government implement the Transportation Association of Canada vision and appropriate parts of the policy framework under the *Planning Act* of Ontario.

Effecting a shift from automobiles to transit

People should be able to move quickly and easily through regions on public transit. Decision-making bodies are required in large urban areas, especially the Greater Toronto Area, to integrate transit services, fare schedules and various transport modes, and to ensure that transportation, urban development and water/sewer infrastructure are planned and delivered on an integrated basis.

The previous section recommended policy directions and actions that will give public transit a better chance to compete for ridership with urban automobiles. This section focuses on incentives that could be implemented to promote increased use of public transit and improve its market share relative to the automobile. Increased transit use would result in major reductions in carbon dioxide emissions.

Transportation and urban planning must be linked

The use and cost-effectiveness of public transit are closely linked to development patterns and road system characteristics. Population density and urban road infrastructure are key factors that can be influenced by planning to make public transit more attractive. Inducing people to move from automobiles to public transit is a major challenge. If land uses are widely separated, road access is readily available and public transit systems are inconvenient, the automobile is the travel mode of choice.

Hidden costs should be reflected in transportation decisions

All forms of transportation create additional, often hidden, costs, including pollution, accidents, health and police costs. These hidden costs are currently paid for by society, but their connection to transportation is not understood by most people.

The Full Cost Transportation and Cost-Based Pricing Strategies study done for the Collaborative estimated the hidden costs of public transit at less than one cent per passenger-kilometre, compared

with two cents per passenger-kilometre for the urban automobile. For automobiles, this works out to \$500 per vehicle per year. The hidden cost of the urban automobile increased to almost eleven cents per passenger-kilometre when a broader set of automobile effects was considered, including congestion, parking and land costs. The conclusion is well supported that the hidden costs of public transit are lower than those of the urban automobile. A more cost-effective and less polluting transportation system would result if these costs were included in public and individual decision-making.

Incentives are needed to increase transit use

The following incentives and measures to increase public transit use are supported by the Collaborative:

- Implement transit priority measures to make transit time-competitive with (or better than) automobile travel and improve transit schedule reliability.
- Ensure intermunicipal fare and service integration, especially in the Greater Toronto Area, and eliminate barriers to cross-boundary transit services.
- Improve intermodal integration, including park-and-ride, bike-and-ride, and transfer facilities with intercity bus, rail and air travel.
- Implement fare policies to reward frequent use, encourage transit use for shorter trips and remove disincentives from the fare system.

On average, one passenger on public transit produces approximately eight times less carbon dioxide than a single driver in a car over the same distance (based on a fully loaded bus versus a vehicle with a fuel consumption rate of 12.0 l/100km).

Effecting a shift from automobiles to transit

- Implement tax reform to encourage increased transit use where transit is available, such as making employer-provided bus passes a non-taxable benefit to employees and an employer-deductible expense, and systematically enforcing existing tax provisions making employer-provided free parking a taxable benefit.
- Implement pricing and supply policies to control parking and encourage transfer to transit.

These measures and incentives illustrate actions that can be taken to increase the market share of public transit. Additional incentives and measures should be considered on an ongoing basis. In the long term, for example, road pricing is a major initiative that could be used to encourage more efficient use of the road system and greater use of transit. Road pricing would also generate much needed revenue to renew and improve all transportation modes.

Integrating transportation planning and urban development

Decision-making bodies should be established in large urban areas to plan and deliver integrated transportation and urban development and oversee the implementation of transit incentives and transit priority measures. Multi-modal, integrated transportation plans should be developed in conjunction with official plans at the regional level. This will ensure that land use, transportation and environmental planning are properly integrated to take full advantage of sustainable transportation options, such as public transit, walking and bicycling. The Greater Toronto Area is an immediate priority due to its rapidly expanding population and its many independent public transit authorities. Effective planning and delivery of compact, mixed-use development, basic road and water/sewer infrastructure, and convenient,

cost-effective transit services is essential. Decisions taken now will affect the shape of the Greater Toronto Area well into the next century.



Innovative funding sources are required

Funding for improved public transit services and ongoing road maintenance and improvement is becoming a critical issue. Revenues from various funding sources should be explored, such as increased car registration fees, toll road charges, parking surcharges and the reallocation of road-building funds. The next section of the report considers a range of mechanisms to encourage increased transit use and raise revenues for transit service enhancements. New transit developments, however, should be based on business cases that ensure the best transit options are considered. Business analyses should also justify the allocation of funds between road and transit, as well as the type of transit investment. The immediate needs, however, are to maintain sufficient funding levels to ensure adequate transit capacity, make the best use of the transit and rail systems we have now, and implement measures to make public transit more desirable as a transportation mode in larger urban areas.

RECOMMENDATIONS

▼ **The Collaborative recommends the creation of decision-making bodies in large urban areas to plan and deliver integrated transportation and urban development.**

▼ **The Collaborative recommends that increased funding for public transit be obtained from user fees and a more equitable allocation of transit and road-building funds.**

Cleaner, more fuel-efficient automobiles

Major reductions in carbon dioxide and air pollutants from automobiles and light trucks can be achieved through modifying driving behavior, improving vehicle efficiencies and shifting to cleaner fuels and alternative fuelled vehicles.

An Ontario strategy to reduce carbon dioxide emissions from the transportation sector must achieve major reductions from automobiles and light trucks, which account for more than 60 per cent of the province's transportation sector emissions. Planning for compact, mixed-use urban areas and enhanced public transit services will reduce vehicular travel demand and trip lengths and provide alternative travel modes for automobile users. These measures should be supported by incentives to further reduce automobile travel and by a commitment to increase the fuel efficiency of the Ontario automobile fleet.

The Ontario fleet of passenger cars and light trucks (including vans) in 1995 is about six million vehicles (4.5 million cars and 1.6 million light trucks). By the year 2005, the fleet is expected to total close to seven million vehicles. Carbon dioxide emissions from the growing automobile fleet will be further increased by trends towards longer distances driven annually per person and fewer occupants per vehicle. Without new measures to reduce travel demand, the total vehicle kilometres driven by the Ontario fleet is projected to

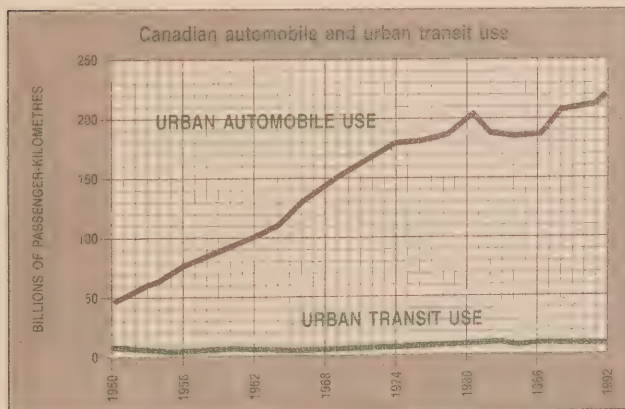
increase from 91 billion in the year 1995 to 140 billion by the year 2020, according to Natural Resources Canada.

Limits to technology-based solutions during the next decade

If current trends continue, auto sector carbon dioxide emissions should return to 1990 levels by the year 2000, then increase by almost six per cent above 1990 levels by the year 2005. The small projected increase in emissions relative to the increased travel demand is due to the penetration of newer, more fuel-efficient vehicles into the Ontario fleet. The Collaborative concludes that technology-based improvements, by themselves, will not stabilize auto sector emissions by the year 2005.

Driving less is the key to progress during the next decade

Based on an Auto Sector study done for the Collaborative, the conclusion was reached that the greatest progress on reducing carbon dioxide emissions from the auto sector during the next decade can be achieved by encouraging people to drive



SOURCES:

Royal Commission on National Passenger Transportation, 1992, *Directions: the Final Report of the Royal Commission on National Passenger Transportation*, Volume 2, Chapter 2, Ottawa, Ontario, Canada.

Canadian Urban Transit Association, Toronto, Ontario, Canada.

Statistics Canada, Ottawa, Ontario, Canada.

U.S. Federal Highway Administration, Washington D.C., U.S.A.

Cleaner, more fuel-efficient automobiles

The federal government recently passed legislation requiring the conversion to cleaner fuels of at least three-quarters of its vehicle fleet by the year 2004. Half of the fleet must be converted to some form of cleaner fuel by 1997. Alternative fuels of interest include natural gas, propane, ethanol, methanol, hydrogen and electricity.

Green Fleets, an initiative of the Toronto-based International Council for Local Environmental Initiatives (ICLEI), is designed to reduce carbon dioxide and mobile source emissions in urban areas through improved efficiency of energy use in the transportation sector. This includes better fleet management and fuel choice trip reduction strategies and land use practices that reduce dependence on automobiles. Canadian municipalities committed to Green Fleets include: Toronto, Ottawa, Edmonton, Montreal, and Vancouver. Other participants include cities from the U.S., South America and Europe.

less (i.e. to reduce their "vehicle-kilometres travelled"). This can be done in a number of ways, including avoiding unnecessary trips, taking public transit more often, ride-sharing and car pooling, and telecommuting. If the total vehicle-kilometres travelled in Ontario could be held constant over the next decade, emissions of carbon dioxide from the auto sector would almost be stabilized at the 1990 level. A three per cent reduction in total vehicle-kilometres travelled would result in carbon dioxide emissions five per cent lower than the 1990 level. Thus, immediate attention should be focused on measures that can modify driving behavior.

The benefits of using cleaner fuels and alternative fuelled vehicles

Further reductions in carbon dioxide emissions may be made by increasing the use of cleaner fuels, such as natural gas, propane, ethanol, methanol, hydrogen and electricity. The use of these fuels can also result in major reductions in several of the regulated air pollutants, such as nitrogen oxides, volatile organic compounds and carbon monoxide. There is considerable debate, however, about the extent to which these fuels reduce total greenhouse gas emissions when a life cycle approach is used to calculate emissions from the production, distribution and consumption of these fuels.

The Collaborative finds that sufficient environmental benefits can be obtained from the use of cleaner fuels and the development of related technologies to justify the maintenance of government support, such as fuel tax exemptions. Research is needed to ensure that the potential carbon dioxide reduction benefits are achieved in the most cost-effective ways. Fleet procurement by governments and large companies is the principal mechanism by which the feasibility and advantages of these fuels and vehicles in the automobile fleet can be demonstrated. This should be followed by broad consumer marketing of the vehicles developed and demonstrated in government and private fleets.

Research and development funding support to original equipment manufacturers could help Ontario get on the leading edge of technology development for alternative fuels and vehicles, as has already happened to a considerable extent with natural gas vehicles. Limited incentives to encourage consumers to purchase alternative fuelled vehicles are warranted. The maintenance of existing tax exemptions and support for alternative fuels should be considered to help establish a vibrant market.



Ontario is a leader in natural gas technologies, such as natural gas buses.

A new generation of vehicles

After 2005, auto sector carbon dioxide emissions will increase rapidly unless further fuel-efficiency gains are made. One of the best possibilities for vehicle technology breakthrough beyond 2005 is the Partnership for a New Generation of Vehicles (PNGV). The PNGV is the principal U.S. policy instrument to promote energy-efficient motor vehicle technology. It involves a research and development partnership between the Big Three vehicle manufacturers and the U.S. government. The PNGV's goal is to develop concept vehicles by the year 2000, and production prototypes by the year 2004, for vehicles that will achieve a threefold increase in fuel efficiency over today's vehicles, while maintaining size, performance, utility and safety. It is difficult to predict the success of this initiative, but Ontario should play an active role in the PNGV, both to help the initiative succeed and to maximize the economic benefits that could flow to Ontario from involvement in it.

The potential contribution of electric vehicles to reducing carbon dioxide emissions and achieving other environmental and economic benefits should be actively explored. The Collaborative did not reach firm conclusions on the merits of electric vehicles. Further study and development work is needed before the role of electric vehicles in Ontario's transportation system can be adequately assessed.

Over the longer term, breakthrough technologies may be developed for alternative fuels, such as hydrogen. Vehicles powered by hydrogen could conceivably generate no net carbon dioxide emissions and only minor emissions of other greenhouse gases if the hydrogen is not produced from fossil fuel sources. A hydrogen-fuelled vehicle would also emit virtually no hydrocarbons, particulates or

carbon monoxide. The only significant air pollutant emitted would be nitrogen oxides. The use of hydrogen as a vehicle fuel is not expected to be widely commercialized before the year 2010. Hybrid vehicles driven by a combination of batteries and a small internal combustion engine also offer great promise.

Incentives to influence driving behavior and vehicle fuel efficiency

A Policy Instruments study done for the Collaborative looked at financial and regulatory incentives that could be used to reduce vehicle-kilometres travelled and encourage people to purchase more fuel-efficient vehicles. The following instruments were studied in depth:

- Gasoline pricing
- Feebates
- Parking pricing and parking supply
- Corporate average fuel economy standard
- Congestion pricing

Progressive increases in the price of gasoline were identified by some members of the Collaborative as a cost-effective measure for Ontario. Various studies have shown that the short-term consumer response to an increased gasoline price is to reduce vehicle-kilometres travelled through mode-shifting, car pooling or

Natural gas fuelling station.



Cleaner, more fuel-efficient automobiles

Public acceptability of new taxes or other government revenue sources requires an explicit linkage to the benefits received, such as improved transit services, or to concepts such as "revenue neutrality", in which new revenues are offset against reduced costs to the public in other areas.

foregone travel. The longer term consumer response, particularly with an expectation of future gasoline price increases, is to shift to more fuel-efficient vehicles. Automobile manufacturers respond by incorporating cost-effective technologies into their products. Approximately half the projected fuel consumption reduction due to a price increase would come from reduced vehicle usage, with the other half coming from increased fuel efficiency of the fleet.

The Policy Instruments study estimated that an incremental real (i.e. inflation adjusted) gasoline price increase of 2¢/litre annually for the next 20 years would reduce carbon dioxide emissions from the automobile and light truck fleet to the 1990 level and maintain this level to the year 2015. An annual price increase of 3¢/litre would achieve a 20 per cent reduction in carbon dioxide emissions by the year 2015. If a gasoline tax were used to effect the price increases at these levels, it would generate annual incremental revenues for the Ontario Government on the order of two billion dollars by the year 2015. Revenue increases of this magnitude would require careful consideration in the context of overall tax reform, which is currently under review in Canada and other countries, and should also be considered in the context of overall economic competitiveness.

The macroeconomic impacts of a real gasoline price increase of 2-3¢/litre annually have been studied in Canada, the United States and the United Kingdom, with the conclusion reached that the long-term effect on the economy in each case would be small and manageable, or even positive. The revenues could be used by the government in several ways that might be acceptable to the public, according to opinion polls, including:

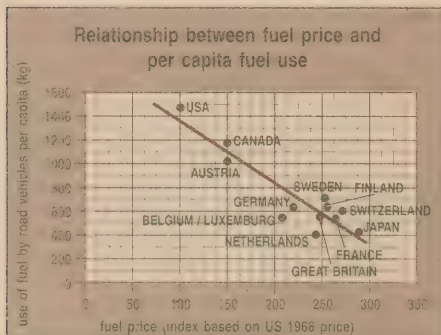
- Funding transportation system improvements, such as transit and non-motorized transport improvements, cleaner fuel incentives and technology development.
- Deficit reduction.
- Personal and corporate income tax reduction.

The Collaborative supports the further development of public transit and related transportation system improvements. Higher gasoline prices that permit the government to recover the hidden costs related to automobile use would move towards fuller cost pricing. Road tolls or congestion pricing would be another longer term mechanism that could be considered. The net result should be a more cost-effective, equitable and less polluting transportation system in Ontario.

The inequity of potentially higher gasoline prices for rural and northern areas of Ontario would have to be addressed. This might be accomplished by applying differential automobile registration fees in these areas in recognition of the longer distances between communities and the higher cost of fuel in the north. New policies may be required to ensure that issues of macroeconomic stability and industrial competitiveness are addressed, and assistance to lower income groups may be necessary to address measures

SOURCE

Petroleum Communication Foundation,
Gasoline Price Report April, 1994,
Calgary, Alberta.



that are regressive. Education and public awareness of the need for and benefits of the policy changes would be essential to successful implementation.

Automotive sector support for improving fleet fuel efficiency

Higher gasoline prices encourage consumers to purchase more fuel-efficient vehicles, thus creating a demand that manufacturers can address. In conjunction with increased gasoline prices, the automotive sector should develop a Memorandum of Understanding to increase the availability of fuel-efficient models. The voluntary approach, supported by gasoline price increases, is preferred by some Collaborative members over a regulatory approach that could introduce economic distortions. Regulation should be pursued if the voluntary/incentive approach does not yield acceptable results within a reasonable timeframe. If regulation is required, attempts should be made to seek a consistent approach across North America to ensure that it has the greatest effect with the least economic distortion.

A mandatory vehicle inspection and maintenance program

There is sufficient operating experience from British Columbia's AirCare program and the extensive U.S. experience with

vehicle I&M programs to enable Ontario to successfully introduce a mandatory program. In April 1995, Ontario opened a pilot vehicle I&M station in Mississauga. This station has tested more than 3,000 cars and light trucks for hydrocarbon, carbon monoxide and nitrogen oxide emissions, in accordance with U.S. Environmental Protection Agency (EPA) emission standards. Based on preliminary results, an average of 20-25 per cent of Ontario vehicles voluntarily brought to the station are expected to emit pollution levels that exceed EPA standards, mainly due to poor maintenance. The B.C. experience also indicates there are multiple benefits from a properly designed I&M program, including reductions of carbon dioxide emissions.

The effectiveness of the measures proposed in this section to reduce automobile-related carbon dioxide emissions would be greatly improved if Canada and the United States followed similar paths. The Ontario government should take the lead in discussing these measures with other governments in Canada to determine the extent to which a uniform national approach can be developed. The government of Canada should take the lead in consultations with the United States on a uniform North American approach.

In the first full year of operation, British Columbia's AirCare program reduced light-duty vehicle pollution in the Lower Fraser Valley by 20 per cent - a reduction of 113,000 tonnes of harmful pollutants. The program will be extended to include emission testing of heavy-duty trucks and buses on a voluntary basis in early 1996, and will be replaced within two years by a mandatory testing program.

RECOMMENDATIONS

▼
The Collaborative recommends that the Ontario government take the lead in consulting with other governments in Canada on the issue of gasoline prices and developing a Memorandum of Understanding with the automotive sector. The objectives are to reduce total vehicle-kilometres travelled and increase the overall fuel efficiency of the Ontario and Canadian automobile fleets.



Pollution Probe's voluntary vehicle emission testing clinic, Bolton, Ontario, June 1995.



Government of Ontario pilot vehicle I&M station, Mississauga.

Reducing emissions from freight transport

Reductions of carbon dioxide emissions can be achieved from freight movement through better driving practices, vehicle efficiency improvements and the increased use of intermodalism. In the longer term, prices should reflect the fuller environmental and social costs of freight transport.

Freight transportation includes truck, rail, marine, air and intermodal freight movements. Trucks move the largest tonnage of freight in Ontario (40 per cent), and move 70 per cent of the freight by value. Railways move the largest share of freight in terms of tonne-kilometres (51 per cent). In general, trucks tend to haul small shipments over shorter distances, while rail predominates for the movement of bulk commodities over longer distances. The two modes compete for certain freight movements over a range of distances. They also co-operate to provide intermodal freight movement services.

In 1990, freight movement contributed almost 30 per cent of total carbon dioxide emissions from the transportation sector in Ontario. Truck transportation accounted for 70 per cent of freight-related carbon dioxide emissions, and rail followed with 21 per cent. The marine and air modes contributed relatively small shares.

Carbon dioxide emissions from freight movement are expected to increase

Significant gains have been made in recent years in the energy efficiency of freight transportation technologies, particularly for trucks, in which fleet turnover occurs at a relatively fast pace, but also for rail locomotives. More improvements are anticipated, but not on the scale of the breakthrough technologies that are possible in the auto sector. Thus, carbon dioxide emissions are expected to increase as Ontario's population grows, commercial trade volumes increase and industrial activity becomes integrated into a North American freight

logistics system that is dependent on timely, efficient transportation. In the absence of new measures or population stabilization, carbon dioxide emissions from the Ontario freight transportation sector are projected to be 14 per cent higher than the 1990 level by the year 2000, and 24 per cent higher by the year 2005.

Improved intermodal services will continue to increase energy efficiency

Measures examined by the Collaborative to improve vehicle technologies and increase the efficiency of operations in truck transportation would not, on their own, bring total carbon dioxide emissions significantly closer to the 1990 level by the year 2000. The same is true of technologies and operational improvements for the rail mode. The only scenario that comes close to achieving 1990 levels is if a substantial portion (i.e. one-third) of truck shipments over a 500 kilometre distance (where truck/rail competition traditionally begins) could be diverted to rail intermodal service. It is too early to assess the market potential of new intermodal technologies and service improvements that are being introduced by the railways, but this is clearly a direction in which significant carbon dioxide emission reductions can be achieved.

Freight movement is complex - there are no easy answers

Freight movement decisions are taken in a highly competitive market. Industries choose transportation modes based on many factors, including cost, delivery time, reliability, availability and security. To test the feasibility of increasing

intermodal freight transport and other efficiency improvement opportunities, the Ontario Ministry of Transportation commissioned six case studies involving the following freight transport users:

- Green Forest Lumber Ltd., Chapleau
- H.J. Heinz Company of Canada Ltd., Leamington
- General Motors of Canada Ltd., Oshawa
- Suncor Inc. (Sunoco), Sarnia
- Canadian Tire Corporation, Brampton
- Mount Sinai Hospital, Toronto

Shippers at these organizations consider a complex combination of service factors in their choice of modes and carriers. The multiplicity of choices available, and the weighting of these choices, vary from shipper to shipper. Canadian Tire, for example, is most concerned with the timely delivery of goods to its stores, especially for special items advertised in its flyers. General Motors needs to ensure the timely receipt of parts at its final assembly plant so that the continuous production of vehicles is not disrupted. General Motors will pay a premium for this service. For the shipment of finished vehicles, however, time is not as important a consideration as the freight rate and the condition of the new vehicles when they arrive at their destinations. In general, shippers who need fast, accurately timed shipments prefer trucking over rail, while price conscious shippers or shippers with heavy commodities tend to prefer rail.

The case studies commissioned by the Ministry of Transportation highlight the complexity of freight movement decisions and caution against looking for simple solutions or quick fixes. Ontario's current industrial system developed largely in the context of decreasing real fuel prices, although periods of prolonged fuel price

increases occurred in the 1970s in response to energy crises. Ontario's economy and many of its communities are centred around truck-dependent industries. The pattern of development might have been different if the full environmental and social costs of fuel consumption had been understood and taken into account in earlier years. Higher fuel costs may have resulted in greater use of rail transport, less air transport, more fuel-efficient engines, lighter vehicles, and community and industry locations that reduced the overall demand for freight transport.

Over the longer term, moving towards full cost transportation pricing will be essential to rationalize Ontario's transportation systems. It will take time, however, to work out acceptable fuller cost pricing methodologies and implement appropriate pricing mechanisms. Account must also be taken of the competitiveness effects of different transportation policies and practices in the U.S. and Canada. In this regard, the levying of fuel taxes and property taxes on Canadian railways are particular issues that should be addressed since they result in higher rail transportation costs in Canada relative to the U.S.

Intermodal transportation—the use of two or more transportation modes for the movement of freight.



Reducing emissions from freight transport

Short-term measures to increase energy efficiency of freight movement

In the short term, the Collaborative supports the following measures to encourage energy efficiency improvements in freight transportation:

- Improve rail intermodal services to make this option more attractive to a greater share of the freight market, especially for long-haul freight.
- Enhance educational initiatives, such as the Ministry of Transportation's DriveSave and, in particular, anti-idling programs aimed at all modes of freight transportation.
- Conduct research on emissions or energy pricing measures that have the effect of increasing the market value of fuel efficiency improvements.
- Explore ways to redress imbalances in fuel tax and property tax treatments for railways in Canada and the United States, as well as imbalances in the road transport industry that may put Canada at a competitive disadvantage.

- Examine the economic, social and environmental effects of changing standards for both truck and rail, such as vehicle weights, vehicle dimensions and intermodal compatibility, with the objective of increasing fuel efficiency and reducing emissions of carbon dioxide and other air pollutants.

These measures are not expected to stabilize carbon dioxide emissions from freight movement in Ontario in the near future, but they will begin to move Ontario in the right direction. Since the Ontario economy operates largely in a North American trading system, care must be taken not to damage our economic competitiveness, while pursuing energy efficiency improvements. This argues for working closely with the United States, Mexico and other countries to maintain a level playing field in the freight transport sector, while finding ways to more fully reflect the costs of freight transport in market prices and shipping decisions.

In many ways, dealing with freight movement energy efficiency raised issues beyond the scope of the Collaborative, such as trade policy and issues related to the overall demand for goods and services (i.e. the consumer society debate). Some of these issues are best dealt with at the national and international levels.

RECOMMENDATIONS

▼ **The Collaborative recommends that railways enhance their intermodal freight transfer facilities and services and continue to develop new intermodal technologies. The government of Ontario should encourage the use of energy-efficient and cost-effective transportation modes and practices where opportunities exist.**

▼ **The Collaborative recommends that the government of Ontario conduct research on the social and environmental costs of freight transport, with the objective of moving towards fuller cost pricing on a North American basis.**



Energy-efficient trucks contribute to lower carbon dioxide emissions.



Intermodal rail services can also contribute to lower carbon dioxide emissions.

Conclusions and future directions

Ontario faces a major challenge in controlling carbon dioxide emissions. Our population is growing rapidly compared to other industrialized regions, and the economy is expanding in concert with this population growth, putting continuous upward pressure on carbon dioxide emissions. Achieving significant per capita reductions in carbon dioxide emissions can readily be done, but stabilizing Ontario's emissions and reducing them below the 1990 level will be difficult. Fossil fuels are an integral part of the Ontario economy and fossil fuel-based technologies have established a strong influence on North American industry and culture. Transportation technologies and infrastructure that lessen fossil fuel dependence are essential if climate change is to be effectively addressed, but these will not be implemented quickly. A transition period will occur, during which technologies and human behavior must be guided towards more efficient and cleaner transportation systems and choices.

The Collaborative explored a large number of options and measures to reduce carbon dioxide emissions from transportation. Urban planning measures that encourage compact, mixed-use developments and lead to reduced travel demand were emphasized, as were measures to increase the market share of public transit relative to urban automobiles. Measures to reduce automobile use and improve vehicle fuel efficiency were recommended. Finally, ways to reduce carbon dioxide emissions from freight movement were examined, with suggestions made to begin to address this emission source through better driving practices, vehicle efficiency improvements and greater use of truck to rail intermodalism. More work is needed in each of these areas, but Collaborative members believe the policy directions recommended in this report are sound and should be acted upon without delay.

The recommended strategy will result in a number of benefits beyond reductions in carbon dioxide emissions, including reduction of local air pollution, reduced traffic congestion, lower road-building and maintenance costs and the conservation of agricultural lands. Economic benefits will also result from the introduction of advanced electronics, computers and communications technologies into the transportation sector, and the development and implementation of cleaner fuels and alternative fuelled vehicles.

Policies such as user fees, gasoline prices or road tolls could significantly reduce carbon dioxide emissions, but the implementation of these measures requires public and political support. Some Collaborative members believe that widespread public concern already exists and that the public will respond to political and corporate leadership on climate change. If this is true, there is a greater opportunity to reduce carbon dioxide

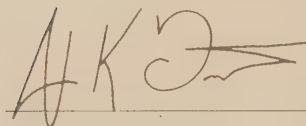
emissions than was projected in some of the research work done for the Collaborative. Parallels were drawn with the positive public response to the Blue Box in Ontario. A similar response to climate change might be triggered by increased efforts on education and awareness-raising.

Ontario's success in resolving major environmental problems in the past gives hope that climate change can also be dealt with. The reversal of eutrophication trends in Lake Erie and other Great Lakes was one such success, and the progress currently being made on combatting acid rain is another. These issues involved environmental damage over extensive regions. They required co-operation between the United States and Canada. And they benefitted from leadership by the Province of Ontario. Climate change is a problem that requires both regional and global co-operation.

Ontario could play a key national and international role on climate change by becoming a leader and showing that progress can be made. Leadership means having a visible presence on the national and international scenes, supported by continuous progress on reductions of carbon dioxide emissions in Ontario. The strategy outlined in this report could form the basis for leadership in the transportation sector.

Collaborative members signatures

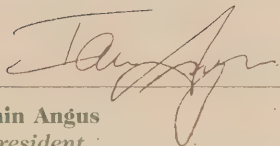
The members of the Transportation and Climate Change Collaborative are pleased to submit this report as a contribution to the ongoing efforts of Ontario and Canada to respond to the Framework Convention on Climate Change. By signing this report, we are committed to sharing the strategy with other organizations and encouraging further public debate. Agreement to sign the report does not mean that Collaborative members speak for other representatives of their sector or constituency, or that past corporate or organizational positions on specific components of the strategy have changed.



Jon Grant
Chair
Ontario Round Table on
Environment and Economy




Anne Whyte
Vice-Chair
International Development
Research Centre



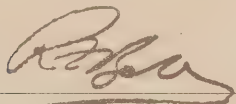
Iain Angus
President
Iain Angus & Associates



Louise Comeau
Campaign Director
Sierra Club of Canada



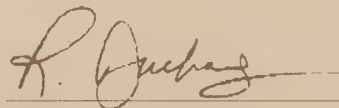
Don Dewees
Vice-Dean, Faculty of Arts and
Science, University of Toronto



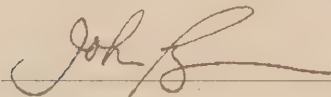
Richard Baker
President and CEO
Canada Transport International Ltd.



Al Cormier
Executive Vice-President
Canadian Urban Transit Association



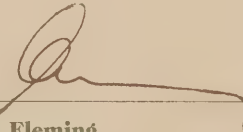
Richard Ducharme
Managing Director
GO Transit



John Bergsma
President and CEO
Union Gas



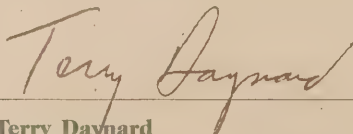
David Crombie
Commissioner
Waterfront Regeneration Trust



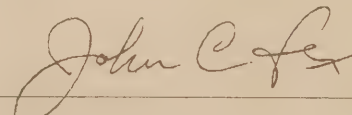
John Fleming
City Administrator
City of London




Jim Bruce
Chair
Canadian Climate Program Board



Terry Daynard
Executive Vice-President
Ontario Corn Producers' Association



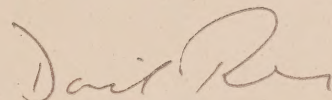
John Fox
Executive Vice-President
Ontario Hydro



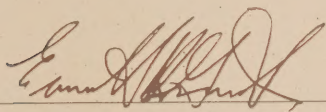
John Gartner
Commissioner of Planning
Metro Toronto



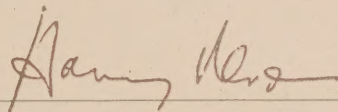
John Lacey
Commissioner of Planning
Region of York



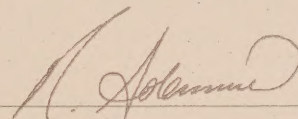
David Runnalls
President
Runnalls Research Associates Inc.



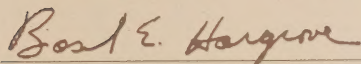
Emmett Grant
President
Cooper Automotive



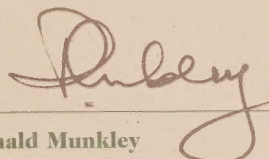
Harvey Mead
Member, National Round Table on
the Environment and the Economy



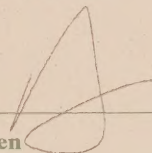
Richard Soberman
Chair
Department of Civil Engineering,
University of Toronto



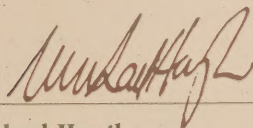
Buzz Hargrove
President
Canadian Auto Workers



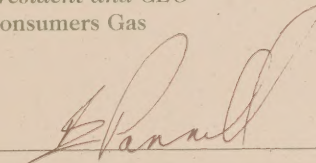
Ronald Munkley
President and CEO
Consumers Gas



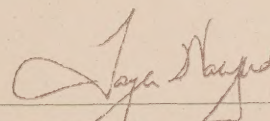
Bob Stephen
President
Agincourt Infiniti Nissan



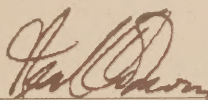
Michael Hough
Principal
Hough Stansbury Woodland Naylor
Dance



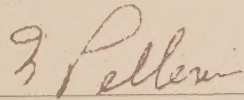
Brian Pannell
Executive Director
Pollution Probe



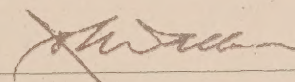
Tayce Wakefield
Vice-President
General Motors of Canada



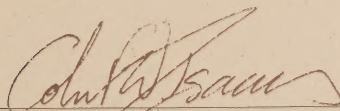
Neal Irwin
Managing Director
IBI Group



Normand Pellerin
Assistant Vice-President
Canadian National



John Wallace
President and CEO
Ontario Northland Transportation
Commission



Colin Isaacs
Principal
Contemporary Information Analysis

Representatives from
Navistar International and Sunoco Inc. participated in the Collaborative, but elected not to sign the final report.

Acknowledgements and Collaborative research reports

Collaborative members gratefully acknowledge the initiative and efforts of the multi-stakeholder policy group which guided the background research and consultations that made this report possible. The time, talent and energy of these individuals during the past year are reflected in the following 10 research reports.

Ontario Round Table staff

Ken Ogilvie
Rosanne Hahn
Ron Nielsen
Abby Podhy
Ruth Meehan

Support personnel

David Shantz
Patrice Côté

Facilitators

Rodger Schwass
Mary Rowe

Research done for the Collaborative

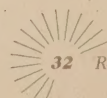
The following research studies and initiatives were commissioned to advise the Collaborative:

- **Climate Change Impacts** - Highlights the most up-to-date information on the potential effects of climate change on Ontario. *Prepared by Environment Canada, Smith & Laven-der Consultants, and Sustainable Futures.*
- **Reducing Greenhouse Gas Emissions from the Ontario Automotive Sector** - Identifies and evaluates options to reduce carbon dioxide emissions (and other greenhouse gases) from the automotive sector that are feasible and implementable in Ontario by the year 2005. *Prepared by The Osborne Group, DesRosiers Automotive Consultants Inc., and Pilorusso Research and Consulting Inc.*
- **Transportation Technologies** - Explores the role that emerging technologies might play in reducing greenhouse gases from transportation sources during the period 2005 - 2030. *Prepared by Pilorusso Research and Consulting Inc.*
- **Urban Planning/Public Transit** - Examines the contributions that changes in urban form and increased use of public transit systems could make in reducing carbon dioxide emissions. *Prepared by IBI Group.*
- **Full Cost Transportation and Cost-Based Pricing Strategies** - Identifies the full costs, including external environmental and social costs, of major transportation modes, and develops pricing and incentive strategies to achieve more sustainable transportation in Ontario. *Prepared by IBI Group, and Boon, Jones & Associates.*
- **Freight Movement (two separate studies)** - Identifies options to reduce freight-related carbon dioxide emissions by the years 2000, 2005 and 2010, and tests these options through case studies on actual freight movements from Ontario industries. *Prepared by Transmode Consultants Inc. and by the Research and Traffic Group.*
- **Visioning** - Examines alternative and creative approaches to community design and related transportation options, and presents a vision of sustainable transportation. *Prepared by the Metrix Group with the assistance of Joell Vanderwagen.*
- **Policy Instruments** - Identifies a full range of policy instruments that should be considered to reduce carbon dioxide emissions from the transportation sector, and examines in detail those policy instruments most suitable for Ontario. *Prepared by Apogee Research and The Osborne Group.*
- **Sustainability Indicators** - Develops and assesses criteria for indicators that can be used to evaluate measures that impact on the sustainability of the transportation sector. *Prepared by IndEco Strategic Consulting Inc.*

Collaborative policy group

David Bell, *Chair*

Karen Baker
Jay Barclay
Nilam Bedi
Bob Bell
Bryan Bertie
Michael Burke
Bill Burns
Ovi Colavincenzo
Bill Davis
Nick De Carlo
Jack Gibbons
Alistair Gibson
David Henderson
Henry Hengeveld
Bob Hodgins
John Hutchison
Jane Inch
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Keith Puckett
Dave Roberts
Mike Ronson
John Sanderson
Ellen Schwartzel
Marianna Shats
Adam Socha
Perry Stover
Bryan Swift
Randa Tadros
Yasmin Tarmohamed
Rod Taylor
Marcia Weaver





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ISBN 0-7778-4672-1

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